

---

# Putting the Excitement Back into Science Education

by Daniel Barstow

*“Education is not the filling of a bucket, but the lighting of a fire.” William Butler Yeats*

President Obama recently announced a new program, called *Educate to Innovate*, to help improve education in science, technology, engineering and math (STEM). He called on leaders in business and education to identify and support some of the most powerful STEM education programs, to inspire, engage and educate young people. This is a powerful and important idea – without inspiring students to learn and pursue careers in these fields, our nation is at serious risk over the next decade and beyond.



*Courtesy of Challenger Center for Space Science Education*

Inspiring and supporting students can manifest in so many creative ways. By funding innovative educational programs, you can help sustain and extend their impact. Volunteering to help in local schools provides extra presence in the classroom, whether you’re sharing your own expertise or tutoring needy children. You can also share your own work through engaging educational web sites. And you can promote workforce

development by having students visit your workplace, and even engage some students as interns. All of these activities help students learn about the diverse opportunities in science, technology, engineering and math, and help them develop new skills and content knowledge.

Having seen comparable programs over the years, I’d like to offer some words of advice – not in the scope of such programs, but in their nature, especially with regard to engaging students directly with the substance of your work. Put simply, you should avoid the trap of merely explaining your topic, and instead should focus on inspiring and engaging kids in the thrill of science.

In the fields of Earth and space science (of relevance to *Space Times* readers), we certainly have a surplus of important topics to cover. But students already get an overload of topics, what Yeats called “filling the bucket.” Textbooks, tests and classroom lectures are full of content knowledge. It’s not at all clear that adding more topics will fix the deep problems and challenges affecting our educational system.

Instead, we need to focus on the “lighting a fire” part of Yeats’ quote – putting the excitement back into the experience of science. Think for a moment about your own childhood, and the pivotal moment(s) when you got bitten by the science bug. What stands out most clearly in your mind as the spark that lit the fire? I’ve asked this question to a lot of scientists, and I’ve never had anyone answer “a great textbook” or “a clear explanation of a topic.”

Most people cite an inspirational moment – a teacher with contagious enthusiasm, a field trip to a stellar museum, a fascinating science program on TV, a birthday gift of a telescope. In the current vernacular, engaging web sites or Twitter messages could spark contagious enthusiasm.

In Spanish, they call this “chispa,” or spark. Without a spark, there is no fire, no matter how much wood you pile on.

So, space enthusiasts, here are some examples of chispas.

Dust off your childhood telescope, gather a few other night-sky fans, and have a star party. Invite a classroom of kids (or just set up on a street corner!). Let kids see the stars and planets. Don’t just name them – tell stories about whatever

---

planet(s) are visible. Bring them to life. Spark curiosity. Entice kids to want more.

If your field is Earth science, take kids virtually aboard the International Space Station. Show them the windows astronauts use to explore Earth and then show your favorite pictures of Earth from space (you can find a few hundred thousand at [earth.jsc.nasa.gov](http://earth.jsc.nasa.gov)). Don't start by explaining plate tectonics or pixel sensors – just let kids see the majesty of our glorious planet. Then think of the images as mystery stories – why do volcanoes form along the Pacific coast of North America? Let kids mull on the same sense of wonder that lies at the heart of your own science explorations.

If you make a web site about your research, don't turn it into a virtual lecture. No matter how clearly you can explain the content, that's only a part of the equation. That's the woodpile. Figure out the spark. How can you turn your web site into an investigation tool for young people? If you search for exo-planets by monitoring the subtle variations in light from a distant star, make a tool that shows these variations and let kids find the exo-planets. And then tie this to the grand mystery of searching for life and habitable planets.

I don't mean to go on a diatribe here. Of course, kids need content knowledge. But I've seen way too many wonderfully engaging educational programs get hacked at the knees by narrowly aligning them with content topics, rather than with the equally important science thinking skills and attitudes of inquiry, exploration and discovery. Some might respond, "Whoops, our state doesn't do stars and planets in middle school, so you can't do that star party." Well, I've reviewed lots of state science standards, and every state, without exception, includes inquiry, exploration and discovery. And I've also seen study after study showing the ripple effect – that getting kids excited about STEM, almost regardless of actual topic, deepens learning and understanding more broadly in these fields. Move kids from "science is boring" to "science is exciting," and their world changes forever.

This is a pivotal moment in our nation's history. So many things are changing around us. We need a new generation of scientists and engineers to invent new energy resources, resolve the challenges of global climate change, invent cures for cancer and AIDS, and even create the next generation of human space exploration now that the Space Shuttle is retiring. If we don't inspire and engage our young people in these dynamic fields (and others as yet unimagined), our nation will fall into the backwaters of science, technology, engineering and math. We will watch as China, India, Brazil and Japan move on ahead, unless we confront this educational, and I would say, inspirational, challenge.

Twenty-four years ago our nation had a comparable challenge to confront. After the tragedy of the Space Shuttle Challenger, our nation questioned our commitment not just to human space exploration, but even more deeply our ability to invent new technologies of exploration and discovery. As one important response to that soul-searing crisis, the families of the astronaut heroes established an educational program that features the engaging and inspirational approaches advocated here. Challenger Learning Centers, in 47 locations, now reach 400,000 students per year, taking them on simulated space missions that inspire and engage. Look at the excitement and focus of each student, and you will understand the depth of impact and the transformational power of these experiences. Challenger Learning Centers helped our nation turn from tragedy to a "can do" spirit.

We need that same spirit now. Study after study has called dramatic attention to the need to excite students to pursue careers in science, technology, engineering, and mathematics, and to develop the 21st century thinking, problem, solving, and teamwork skills our nation needs for our future. Please join us in answering the President's call to action. There are still many young people who need inspiring.

---

**Daniel Barstow is President of Challenger Center for Space Science Education. Visit [www.challenger.org](http://www.challenger.org) or email Dan at [dbarstow@challenger.org](mailto:dbarstow@challenger.org) for more information.**

---

---

---

## Charitable Giving and the AAS

A popular way of donating to an organization is through a gift by means of a will (i.e., to make a bequest). You may decide to consider either a general bequest to the American Astronautical Society (AAS) or a bequest targeted to an existing or new AAS scholarship or an award fund.

These bequests are deductible against estate and inheritance taxes. There are also tax advantages when making charitable donations to the AAS while you are living. Such gifts could contribute to the memory of someone who has passed away or be made in the honor of a person who is still alive. In addition, special occasions offer opportunities for gifts to be directed to the Society.

As a final note, although the AAS is able to provide suggestions for charitable giving, your financial or legal advisor should be consulted about such actions.